



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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3 Applicant: Mircea M. Bayer and Karlton D. Powell

4 Title: HOMOGENIZING OPTICAL SHEET, METHOD OF
5 MANUFACTURING, AND ILLUMINATION SYSTEM

6 Serial No: 10/748,618

7 Filing Date: December 30, 2003

8 Group Art Unit: 2872

9 Attorney Docket No: BAYM 101

10 Date: March 24, 2004

11

12 Mail Stop: Patent Applications
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14 P.O. Box 1450
Alexandria, VA 22313-1450

15 **INFORMATION DISCLOSURE STATEMENT UNDER 37 CFR 1.97**

16 In compliance with Applicant's and his attorney's duty of disclosure under 37 CFR
17 1.56, the Applicant does hereby submit the following Information Disclosure Statement,
18 Form PTO - 1449, and copies of the references listed thereon.

19 A patent search was manually conducted for the invention described in the above-
20 referenced patent application. In the course of the search, no patents were found for an
21 apparatus that has the same structural features or that operates in the same manner such as the
22 invention listed above. The following five (5) patents, however, were noted as being of
23 interest and are hereby brought to the Examiner's attention as references AA - AE. The

1 significance of each listed reference is as follows:

2 AA. Reference U.S. Patent No. 6,411,439 (Nishikawa) discloses a microlens array
3 manufacturing method that has a first step for forming a master having a plurality of curved
4 surfaces; a second step for forming a duplicate master having a plurality of curved surfaces
5 transferred from the curved surfaces on the master; and a third step for forming a light
6 transmitting layer having a plurality of lenses transferred from the curved surfaces on the
7 duplicate master. The frequency of producing high cost masters is thus reduced, enabling
8 microlens arrays to be manufactured at low cost.

9 AB. Reference U.S. Patent No. 6,363,603 (Nemoto et al.) discloses the present
10 invention that provides a method for manufacturing an erect image, unity magnification, resin
11 lens array by injection molding. Two injection-molded lens plates are stacked such that
12 convexly warped sides thereof face each other or such that a convexly warped side of the lens
13 plate whose warp is greater than that of the other lens plate faces a concavely warped side of
14 the other lens plate, while directions of resin injection thereof are aligned so as to optically
15 avoid the influence of molding shrinkage. Engagement spigots and engagement sockets are
16 employed in order to align the two lens plates. The two stacked lens plates are secured by
17 clipping of peripheral portions thereof.

18 AC. Reference U.S. Patent No. 5,816,681 (Tedesco) discloses a lighting assembly
19 that includes an on/off source of light and an optical diffuser characterized in that it receives
20 light from the source and emits it in a desired viewing direction, but with underlying surfaces
21 being at least diffusely visible therethrough. Thus, in an automotive or other vehicular
22 application, the surface may be a body panel, the color of which may be visibly evident

1 through the diffuser panel, thereby enhancing desired aerodynamic/styling characteristics.
2 The source of light preferably comprises one or more semiconductor devices such as light-
3 emitting diodes, and the optical diffuser is holographically recorded and provide high
4 transmission and low backscatter to shape the emitted light in addition to its redirection in
5 accordance with a desired beam profile or cross section.

6 AD. Reference U.S. Patent No. 5,499,120 (Hansen) discloses a display that
7 provides comprising a semi-transparent display element (16, 17, 18, 19), such as double super
8 twisted nematic (DSTN) liquid crystal display (LCD) cell, a sub-assembly having backlight
9 elements (11, 12, 13) mounted thereon, and mounting means (20) mounting the display
10 element over the sub-assembly with the display element adjacent to the back light elements,
11 with no diffuser between the backlight elements and the display element. The backlight
12 elements are an array of light emitting diodes of sufficiently wide angle and spaced
13 sufficiently close together that, when viewed from the front of the display element, the
14 display has substantially evenly dispersed brightness across the array.

15 AE. Reference U.S. Patent No. 4,924,356 (French et al.) discloses an illumination
16 system for a display device that includes a plurality of lenslets, which provide partially
17 collimated light with respect to at least one axis of the display. A light box provides
18 uncollimated light to the lenslets. The light box includes a reflector having apertures, which
19 transmit light from the light box to the lenslets. The internal surfaces of the light box and the
20 reflector are highly and diffusely reflective and a high percentage of the light reaches the
21 lenslets.

1 The Applicant and his attorney submit that the above-cited references taken alone or
2 in combination neither anticipate nor render obvious the present invention. None of the
3 references disclose or claim a light homogenizing optical sheet comprising a planar sheet
4 made of transparent material with parallel front and back surfaces, each said front and back
5 surface including a microlens array formed thereon, said microlens array each including a
6 plurality of microlenses each aligned and registered with a microlens on an opposite said
7 front and back surfaces, said planar sheet having a sufficient thickness so that said
8 microlenses on opposite said front and back surfaces are separated by a distance substantially
9 equal to the focal length of said microlens.

10 Also, none of the above-cited references taken alone or in combination disclose or
11 claim an illumination system comprising an array of one or more light-emitting sources at a
12 source plane tiled in a pattern substantially similar yet having pitch equal to or greater than
13 the tiling pattern of the microlens array structure of the optical sheet, collimating optics
14 system having focal length f_c to collimate said sources of the source array, one optical sheet,
15 and imaging optics system having focal length f_{o1} , so as to provide uniform intensity output
16 versus position across the illumination plane within the illuminated area.

17 The listed references relate only to the general field of the disclosure and do not
18 constitute an admission that the references are relevant or material to the claims; they are
19 cited only as constituting the closest art of which the Applicant and his attorney are aware.

20 Respectfully submitted,

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22 DEAN A. CRAINE

23 Reg. No. 33,591

CERTIFICATE OF MAILING BY FIRST CLASS MAIL (37 CFR 1.8)Applicant(s): **MIRCEA M. BAYER & KARLTON D. POWELL**

Docket No.

BAYM 101

Serial No.

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Filing Date

DECEMBER 30, 2003

Examiner

Group Art Unit

2872

Invention:

HOMOGENIZING OPTICAL SHEET, METHOD OF MANUFACTURING, AND ILLUMINATION SYSTEMI hereby certify that this **INFORMATION DISCLOSURE STATEMENT***(Identify type of correspondence)*

is being deposited with the United States Postal Service as first class mail in an envelope addressed to:

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on **MARCH 24, 2004***(Date)***KYTT B. RIHA***(Typed or Printed Name of Person Mailing Correspondence)*

A handwritten signature in dark ink, appearing to read "Kytt B. Riha".

*(Signature of Person Mailing Correspondence)***Note: Each paper must have its own certificate of mailing.**

INFORMATION DISCLOSURE CITATION

(Use several sheets if necessary)

Docket Number (Optional)

BAYM 101

Application Number

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Applicant(s)

MIRCEA M. BAYER & KARLTON D. POWELL

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2872

U.S. PATENT DOCUMENTS

*EXAMINER INITIAL	REF	DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
AA.		6,411,439	06/25/2002	NISHIKAWA	359	619	05/18/1999
	AB.	6,363,603	04/02/2002	NEMOTO ET AL.	29	458	
	AC.	5,816,681	10/06/1998	TEDESCO	362	80	11/02/1995
	AD.	5,499,120	03/12/1996	HANSEN	359	48	
	AE.	4,924,356	05/08/1990	FRENCH ET AL.	362	31	12/07/1988

FOREIGN PATENT DOCUMENTS

	REF	DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	Translation	
							YES	NO

OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, Etc.)

EXAMINER

DATE CONSIDERED

EXAMINER: Initial if citation considered, whether or not citation is in conformance with MPEP Section 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.